Klein, Harvey G. 2020

Dr. Harvey Klein Oral History 2020

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NIH Clinical Center Oral History Project

Interview with Harvey G. Klein

Conducted on March 11, 2020, by Sheree Scarborough

SS: The following is an oral history interview with Dr. Harvey Klein for the NIH Clinical Center. We're meeting in Dr. Klein's office at the Clinical Center. Today is March 11, 2020. Dr. Klein, I've read about your illustrious career, but I don't know when and where you were born or much about your childhood.

HK: I was born in Boston and spent the first twenty-two years of my life in Boston. I went to the Boston Latin School, which at the time was an all-male school and it's the oldest high school in the United States, founded in 1635, which was one year before Harvard College. And we like to think that Harvard College was founded so there would be a place for the Latin schoolboys to go after they graduated. And in fact I did go to Harvard College after graduating from Boston Latin.

SS: Tell me about your family and something about your growing up.

HK: I grew up in Boston out near the Brighton-Newton line, and I went to a local elementary school right across the street. I was the oldest of three boys. My parents were both college-educated, but they weren't professionals, neither one. My father was a small business owner. My mother was a housewife. I'm not sure what else you'd like to hear.

SS: Did you tell me the date you were born?

HK: I was born May 8, 1943.

SS: What about your elementary, junior and high school years in terms of your interest in science? Was there anything there?

HK: No, not really. I was interested in medicine because as is so often the case I had two uncles who were physicians. My great-uncle Abraham Small was a pediatrician who was on the staff of the Harvard Medical School. He always encouraged me to go into medical research because he said that there are wonderful things you could do as a doctor. You could see patients, you could predict what was going to happen by history and physical examination, but the wonderful part about research is that you could find out new things. And even though I was not really a scientist either in high school or in college, I was very much interested in medicine and finding out new things that science could be applied to medicine.

SS: I read the interview you did with Dr. Harden [Victoria Harden, then director of the NIH Office of History] in the 1990s where you speak about your great-uncle, and that he was a great role model for you.

HK: He *was* my role model. That's correct, Abraham Small.

SS: That's nice to have a clear path, yet you didn't choose it right away when you went to Harvard.

HK: Well, it was interesting to me at least is that I knew from a very young age that I really wanted to be a physician and I knew from about the time I was midway through high school that I wanted to be a physician who did research. But the path toward medicine was so science heavy in those days that I thought, "I would like a broader education and do some things that I might not be able to do for a very long time."

Once I started medical school I thought I would have enough science in medical school, so I became a literature major as an undergraduate. And when I did graduate with an honors degree in German Language and Literature, I had read most every major and minor work in German through the 1920s. And I felt that when I went to medical school it took me a while to catch up with some of the sciences, but very few other students entering medical school could speak German or had a literature degree.

In those days it was not encouraged to be a literature major as an undergraduate. You were supposed to be a biochemistry major or a hard science major, or if you weren't bright enough to be a biochemistry major, perhaps a major in physiology or some softer science. But literature was almost out of the question back then. Today, I think we encourage medical students to get a broader education as undergraduates, but not then.

SS: So you were quite a rebel?

HK: I was a bit of a rebel, yes.

SS: It was the 1960s, anyway.

HK: It was the 1960s, yes.

SS: It must have been an interesting time to be in college at Harvard and then to be in medical school.

HK: Well, of course, Harvard was on the cutting edge of the 1960s and the rebellions. In fact, some of the earliest rebels were fellows in Harvard College, Timothy Leary was a lecturer, so it was Berkeley and Harvard, which were the rebellious institutions on the two coasts.

SS: Did that affect you?

HK: Not a great deal. I was focused on medical school, so that I took the basic sciences that I needed. I was very interested in literature. And while you couldn't help but be part of the '60s, I didn't get to Woodstock and a number of other things that possibly other people could do who were less focused than I was at the time. And I have to say that I was also a scholarship student. So in order to have my room and board as well as my tuition paid for, I had to really keep my nose in the books.

SS: Are there teachers and professors that stand out for you at Harvard?

HK: There were several. George Wald, who was a professor of biology and was a Nobel Prize-winner was a role model. He discovered the role of Vitamin A in vision. And the chair of the German Literature Department, Bernhard Blume**,** who was a broadly-educated individual. And, finally, at Harvard you're divided into houses after your freshman year. All freshmen live together in the Harvard Yard, and following freshman year you're divided into houses. I was sent to Eliott House, and the House master was John H. Finley, who was a classics scholar. John Finley was both a brilliant man as well as a wonderful role model, and he wrote my reference for medical school. John Finley was known for his personalized references. And when I came down to Baltimore to interview at Johns Hopkins, the first interviewer said, "I've been waiting to meet you since Professor Finley described you as a Greek god." I thought that went a little far, but I'd love to have that reference now because I'd love to see exactly what John H. Finley the classics professor wrote about me. I think it had a substantial role in my getting accepted at Johns Hopkins.

SS: So why Johns Hopkins?

HK: Well, at the time there were two reasons. First of all, Hopkins was known as a research university and medical school, and possibly the preeminent research medical school at the time. It still is a leader in terms of NIH grants, for example. But, also, I was engaged and got married three days after I graduated from Harvard. My wife said she thought it would be a very good thing since all of my family was in Boston, if we weren't in Boston. Harvard Medical School is one place that I was very interested in and Hopkins was the other, so we moved to Baltimore.

SS: Where was your wife from?

HK: My wife was from Frankfurt, Germany.

SS: How did you meet?

HK: I met her my freshman year in college, between my freshman and sophomore year. As I said, I had become a German literature major, was very interested in German literature, but didn't speak very well. I could read and understand, but I decided that I would go to Germany for a summer to learn how to speak a little bit better. And as luck would have it, one of my friends in the Harvard Yard, in my freshman dormitory, had spent a fair amount of time in Germany since he was from a military family, and had met the American Consul in Germany. And he said, "Why don't you write to him and see if he can find a place for you to stay for the summer."

Again, I was a scholarship student. I needed a job and he did find a place through a German student organization, and that place turned out to be a family that my wife belonged to—my future wife. She at the time was studying English in London, so I had her room. I worked in a German factory. The German that I learned was perhaps not High German, working in a factory. I met her at the end of the summer. The following year she came to the United States.

SS: What is her name?

HK: Sigrid Petri

SS: Interesting story. So then you went to medical school?

HK: I did. I moved to Baltimore and went to medical school, four years at Hopkins.

SS: Tell me something about that time. Did anyone mentor you or were there things that you learned during that time period? This is the late 1960s, 1965 to '69?

HK: Yes. Again, Hopkins was a research institution then as it is now. So for two of the summers I worked in research laboratories and rubbed elbows with some very bright, not only faculty, but also other medical students that went on to very illustrious careers in medicine. Peter Salk, who was Jonas Salk's son, for example, was one of my colleagues both at Harvard and at Hopkins. It was really an exciting place to be for four years.

SS: Were your specialties figured out during that time period?

HK: They were, but even though I had been quite focused on medicine I wasn't as good a planner as other people were. Many of my colleagues in medical school picked out a mentor and very early decided what they wanted to specialize in. I was undifferentiated until probably the end of my junior year in medical school and still wasn't quite sure what I wanted to do, but thought that infectious diseases looked like an interesting thing to do.

This was during the Vietnam War and all of us knew that after finishing medical school we would go into military service. At that time there was a draft and the doctor draft meant that no matter what, you were going to go into the military, so many of us applied to different places that might be service other than carrying a rifle. I applied to the Centers for Disease Control, the CDC, and was accepted because I was interested in infectious disease. That was my junior year in medical school, and of course, by the time I actually got to enter the service, I was no longer interested in infectious disease.

I went through my internship and residency also at Hopkins and became interested in cardiology. But, again, I didn't plan very well. I approached the chair of cardiology at Hopkins, Professor Richard Ross, who I had met from being on the house staff, a resident there, and asked him if there might be a fellowship place for me. And he said, “Yes there would be, but I would have to wait three years,” because I hadn't planned early enough. Frankly, I didn't have three years to wait.

The other senior professor that I had gotten very close to was a professor of hematology, Lockard Conley, who was said to be the world's smartest man, and he probably wasn't the world's smartest man, but he was very bright. So I approached him. He was a professor of hematology, and he said, "Yes, we do have a slot. I'd be delighted to have you." So I became a hematologist instead of a cardiologist, and instead of an infectious disease specialist. It's funny how through serendipity those things happen.

SS: Yes, that is funny. Then you stayed and you worked with him?

HK: Yes, I did my internship, two years of residency in internal medicine and then a fellowship in hematology, all at Johns Hopkins.

SS: Is it unusual to spend all of the different stages of your medical education altogether at the same place?

HK: Yes and no. Obviously, what you wanted to do was go to the very best place for your career in the area that you wanted to specialize in. The house staff training internship and residency on the Osler service at Hopkins was really quite famous, and it was extraordinarily competitive. [The medical service at Hopkins was named for William Osler, one of the four original professors at Johns Hopkins and arguably the most noted physician of his era.] I really wanted to stay there and felt very fortunate when I was accepted to be there for my internal medicine training.

Then, as I said, I fell into hematology by chance. If you did want to be a hematologist there were only two or three really good places in the United States in the '60s, and Hopkins was one of them, and so for that reason I stayed at Hopkins. I suppose I could have gone to Seattle, which had another outstanding hematology program, but my wife thought that that would be a long commute for me. She wanted to stay on the East Coast because her parents were still alive and she thought it was too far for her elderly parents to travel to visit us, so we stayed on the East Coast and I stayed at Johns Hopkins.

SS: And your next step was to come here [to the NIH]. Is that correct?

HK: It was. I was going to the Centers for Disease Control. I was accepted into the Venereal Disease Branch. That hadn't been my choice, but you didn't really have a choice. I was interested in infectious diseases. I had applied to the CDC, and had been accepted several years earlier, and that was the alternative service in the Commissioned Corps of the Public Health Service.

I was probably one of the few people to benefit from the notorious Tuskegee experiments. I say that sort of tongue in cheek because by the time I was to go to the CDC the Tuskegee experiment became very well-known and the entire group in the Venereal Disease Branch left. So I went down to Atlanta with my wife and my daughter Susanna who was two years old to see where we would live at the CDC. And the new group that came into the Venereal Disease Branch said, "What's a hematologist doing at the Centers for Disease Control?" I said, "At the time I applied I was interested in infectious disease, but I became a hematologist." And they said to me," If you can find a position in hematology elsewhere we would release you."

So I looked around at the National Institutes of Health and my professor at Hopkins, Lockard Conley, knew the incoming chief of the Blood Division at the NIH, wrote him a strong reference about me, for which I am eternally grateful. Dr. Ernst Simon, who was the first director of the Blood Division of NHLBI—it was then National Heart and Lung Institute—accepted me as the first recruit as special assistant to the director of the Blood Division. I came to the National Institutes of Health rather than going to the Centers for Disease Control. I came here for two years only as a member of the Commissioned Corps obligated service and then assumed that I would go back to Johns Hopkins where they had a position waiting for me.

SS: It looks like something happened.

HK: Something happened. It turned out that NIH was a great place to be and I just loved it here and my family liked it here as well. Johns Hopkins also felt that in terms of your salary you should be so grateful to be on the faculty of Johns Hopkins that you should probably pay them. It wasn't quite that bad, but it was a very low salary. And even though I wouldn't become wealthy on the government salary, it was actually more than Johns Hopkins paid. I had two children at that point, and when we balanced everything, it seemed like NIH was a good place to spend a couple of years if you wanted to do clinical research. And that really directed my career.

SS: You came here first in the late '70s then?

HK: I came here in 1973, in July of '73, as special assistant to Ernst Simon in the Blood Division of National Heart, Lung and Blood Institute. It was in Building 31. I had a window in an office in Building 31, which today would be unheard of for someone who was right out of a fellowship to have an office in Building 31, let alone an office with a window.

SS: How did you get it?

HK: Just good luck. They had just founded the division. Now the Blood Division is actually off campus. It's not on the campus in Bethesda any more. It's in a building off campus. But it was nice then because it was a very short walk across to the hospital. I had many friends who were working in the hospital at the time, so I was spending as much time in the Clinical Center as I was spending in Building 31.

SS: Your time with NHLBI was short-lived then?

HK: Two years. Those were my years of obligated service. I was a hematologist and I was involved primarily in bleeding disorders such as hemophilia because that's what I had trained in at Hopkins. That was the area of specialty.

I became very interested in blood transfusion, again, for two years reasons. One, because Dr. Simon had done research in preservation of red cells while he was doing his training before he came to NIH. And he said to me, “In many areas of hematology it was quite competitive to get research funding. But blood transfusion was an area that lacked a lot of good research and that might be a good specialty to focus on.”

The second reason was that I had met people here in the Clinical Center in the then Blood Bank of the Clinical Center, Dr. Harvey Alter, who was working on transfusion transmitted infections and Dr. Paul Holland, who was also interested in transfusion transmitted hepatitis. I was asked to look at a position here as a one-year trainee in blood transfusion. I was a board-certified hematologist. I did an additional year here of training in blood transfusion. I became a board-certified immunohematologist and then stayed in this department. I came here to the then Blood Bank for one year and stayed for another forty-something, a total of forty-six years.

SS: That's seems to be a typical story at the NIH. I’m not sure if it is still holds true today.

HK: Certainly then, and I think even up until the present, if you wanted to do clinical research there was just no place like the Clinical Center and the Intramural Program. The universities are great. I've looked at a lot of positions in very highly thought of universities, including Harvard. I always said my mother would turn over in her grave if she knew that I had been recruited back to Harvard Medical School and had turned it down.

SS: I’ll have to hear that story.

HK: Yes. But if you wanted to do clinical research for a lot of reasons this was the best place in the world.

SS: So you came in and you started doing work in the Blood Bank and you were assistant director?

HK: I was the assistant chief almost immediately. I think one of the reasons was that I came from the Heart and Lung Institute where about half of my work had been administrative. I did the budgets for their department and had done a lot of work on grants and contracts in addition to clinical work.

I think the people here really despised doing the administrative activities, and here I was as a young guy coming in and they said, "We'll make you the assistant chief and you can do the budgets and some of the personnel activities." It's one of those things that I used to say I really disliked doing when I came to NIH in 1973. But looking back, these were skills that I certainly wouldn't have gotten voluntarily and they turned out to do me well, subsequently. So I was the assistant chief after two years at NIH and a hematology fellowship.

SS: What was the Blood Bank like then?

HK: It was very small. It was highly thought of because it had good quality staff at all levels, whether they were technologists or physicians, or nurses. There was about twenty-five fulltime equivalent staff here. They collected whole blood. They did not collect some of the components that we collect today. They had a transfusion service laboratory, and they weren't licensed by the FDA, at that point in time. It was a relatively small operation. The research was primarily in transfusion-transmitted infection and in immunohematology, red cell antigens and antibodies. It was a fairly small and relatively narrow specialty, but the people who were here were excellent.

SS: You became the assistant chief in?

HK: 1975.

SS: What was the problem with the blood supply then? What was the main issue you were looking at?

HK: The major complication of blood transfusion in 1973-75 was transfusion-transmitted infection. Dr. Alter, who was a section head for the Infectious Disease Section, had been one of the people who described Hepatitis B, which people thought was the most important transfusion-transmitted infection. As it turned out there were other transfusion-transmitted hepatitis viruses more important than Hepatitis B, and subsequently Hepatitis C, which Dr. Alter played a major role in both discovering and describing the natural history of that disease was a major problem.

In fact, when I came here they had an open heart surgery program in the Clinical Center, and if you had open heart surgery here there was a 30 percent chance that you would leave this hospital infected with hepatitis from blood transfusion, just about one out of three. Incredible. Incredible. That was the major problem in blood transfusion.

There were a lot of other issues. There were problems with bleeding. There were problems with matching blood. Blood transfusion, even though it had been around for a hundred years, was still in its infancy in terms of science. There were a lot of things that one could attack that could really become incredibly interesting and could build your career.

SS: What part of that was your interest?

HK: I had several interests. I became interested in transfusion-transmitted infection, but it wasn't my major area of interest. When I had come from Johns Hopkins, Hopkins had one of the largest sickle cell clinics on the East Coast. By chance I had collaborated with another fellow whose major interest was in sickle cell disease, and he came to NIH as well, Robert Winslow. I came a year after him and we continued a collaboration that we started at Johns Hopkins and I became quite interested in treatment of sickle cell disease.

At that point in time the only treatment was blood transfusion. It wasn't a terrific treatment. We didn't know much about what it did or how it did what it did, but sickle cell disease then as now was a terrible problem. It was a problem that was under-funded. The Clinical Center had a number of patients with sickle cell disease and was interested in sickle cell disease. So I became interested in blood transfusion and how it affects patients with sickle cell disease.

SS: That makes me think of your early publications.

HK: The early publications were on sickle cell disease. We did the first automated exchange transfusion in several patients with sickle cell disease in the United States, and there had only been two others done in the world, one of which said you shouldn't do this procedure because the one patient that they performed this procedure on became comatose, and they attributed that to the procedure. We decided not only to see whether this was an effective therapy, but also to try to study the physiology.

I had a series of papers with Dr. Winslow and some of his staff looking at not only how you perform automated exchange transfusion, but what the outcome was. We measured a number of physiologic changes that took place when you exchanged sickled cells with normal banked cells. We designed the instrument that performed an automated sickle cell exchange. We performed exchanges on more than a dozen patients and we exercised them on an exercise bicycle—before and after exchange transfusion—and measured a number of physiologic changes. We found out that they improved dramatically after you exchange transfused them.

The research that we did then from the idea to the publication was probably less than a year. You could never do that today. The ability to take an instrument that was not designed to do a red cell exchange and modify it to do a red cell exchange would probably take you several years to get permission to do that today. In fact, the instruments today are so designed that you can't change what they do, and of course they're high regulated. These are now medical devices regulated by the FDA. They weren't back then.

We did have approval of the Institutional Review Board, the IRB, we did have informed consent, but it was much less rigorous than it is today. There were good things and bad things involved there. Certainly we felt that the patients were well informed and we had ethical permission to go ahead with the research. On the other hand, when I look at the informed consent process today, which was much less rigorous then and of course you could move much more quickly from the concept of the idea to the performance, to the submission of the manuscript for publication.

SS: So you're saying there are positives and negatives because you had a lot of creativity, it sounds like, in this process.

HK: I think young people are not only creative, but I think they're naive, so they don't see things that someone else who might say, “You could never do that,” or “That will never work.” And it did work and we could do those things. I think now the standard of care for sickle cell disease, prior to transplantation or gene therapy, and now there are a few drugs, was and is red cell exchange transfusion. As I said, we pioneered both the mechanics as well as the physiology of doing red cell exchange.

SS: Is that one of the patents that you hold?

HK: I don't hold the patent. Back then—thinking of a number of the things that had been done by people that I respected, who didn't patent what they did. That was so low on the list that we didn't even think about doing that, so we never patented any of that.

SS: It seems like the NIH did make devices. There were groups of people here that were working on that.

HK: There were. They were biomedical engineers. Again, it was quite exciting because the particular blood cell separator that we used was an instrument that was designed to collect plasma and collect platelets. I had a young fellow in his first year who was very mechanically inclined and I asked him if he thought that he might be able to re-plumb this instrument so that it could exchange red cells instead of collecting plasma. This was Ronnie Garner, and he did that in two days. We tried it on a couple units of blood and then we did a patient.

Prior to that, a group here had designed a different kind of blood cell separator, so even though we didn't use the instrument designed at NIH, the instrument that we used was one that we were familiar with the concept. This was a commercial instrument that we used. But, yes, blood cell separators were actually designed by the Biomedical Branch here at the National Institutes of Health.

SS: Then you got a bomb dropped on you in the early '80s?

HK: Yes and no. I always hesitate to say this because it sounds so callous. The HIV epidemic was one of the most exciting things that had ever happened. It was a new disease. Yes, it was a frightening thing that had happened, but it was clearly a new disease and there were great opportunities not only to discover things, but to help people.

Of course, it was a rare disease in the early 1980s and NIH was importing these rare patients from San Francisco and Miami, Chicago and New York. And we were in the middle of that because it became obvious early in the '80s that this disorder, whatever caused it—we now know what caused it—could be transmitted by blood transfusion. That's when I began to work with a young man who was doing immunology research by the name of Anthony Fauci.

SS: He's in our news today [concerning Covid-19].

HK: Yes.

SS: Who were some of the other doctors that you worked with?

HK: Robert Gallo was here as well. Bob Gallo was right upstairs. And Harvey Alter, who had been working on transfusion-transmitted hepatitis had some of the tools that could be applied to HIV. Again, we knew that transfusion was associated with this disease. We didn't know that it was a virus. We didn't know whether or not it could be transmitted by blood or whether somehow blood transfusion made the recipient immunosuppressed and then became affected with what was then an immunologic disease.

Dr. Alter had a chimpanzee model of transfusion-transmitted hepatitis. Again, serendipity is just incredible. When I was at Heart, Lung, and Blood, I was involved in establishing a chimpanzee colony for hepatitis research. I actually published a paper about it in a veterinary journal. And when I transferred from NHLI to the Clinical Center, I transferred the committee that oversaw use of the chimpanzees for medical research to physicians at the Clinical Center, Dr. Alter and Dr. Holland. So they had access to chimpanzees for hepatitis research.

As it turned out the only model for transmission of HIV was the chimpanzee. So Dr. Alter did a seminal study with Dr. Henry Masur who was here and had described some of the earliest cases of AIDS while he was in New York, taking blood components from patients with AIDS or GRID [Gay-related immune deficiency], what we now know is AIDS, and transfusing them to the chimpanzees. He didn't have an assay at that point in time, but there were changes in the chimpanzees that were consistent with AIDS. The animals didn't develop AIDS, but they had changes in their white blood cells and changes in their lymph nodes that were unlike anything that any of the keepers had ever seen in chimpanzees. It was clear that we were doing something with this blood that came from AIDS patients.

When Gallo developed his assay in '84, before it was licensed in '85, the HTLV-III assay, they modified it so that you could use it in chimpanzees. And it turned out that the animals that we had given blood from AIDS patients, had in fact converted to positivity for HTLV-III, so we had infected them with an agent that we now know as HIV. That was the first known transmission to a primate and was a seminal paper.

SS: You were really on the front lines.

HK: In a variety of ways. We didn't really know that it was a virus. We thought it was transmitted because of the experience that the hemophiliacs had being virtually every patient with severe hemophilia was infected by the Factor VIII blood concentrates that they received. But we didn't know very much about it. Is it a virus, is it something else?

And a series of very interesting, if that's the right word, but I think also very important studies, Dr. Fauci had a series of twins and he had a young fellow by the name of Cliff Lane who is now a fairly important physician here at NIH and still with Fauci.

SS: Did you just see the news? I just read about him, that he's at home because he was possibly exposed to the coronavirus.

HK: I didn't know that. Cliff was a first year fellow and Tony Fauci assigned him this project where they had all of these identical twins, incredible, one of whom would have what we now know is AIDS and the other one didn't. So the question was: Could you take the subjects that had AIDS and somehow cure them using biologics from the unaffected twin? You could do a bone marrow transplant, which we did, and we also transfused lymphocytes, the immune cell, from the unaffected twin, which we collected with our blood cell separators, and infused into the infected twin.

What we demonstrated with that series of experiments, and there were at least a dozen identical twins who were disparate for AIDS, and that was incredible. This was published in the *New England Journal*. You could reconstitute the immune system of the affected twin, so that you could now measure immune function where you couldn't previously, but it wasn't permanent. So it looked as if there was something that was still in that affected individual that would cause them to become immune deficient again, even though you had been able to reconstitute their immune system. We now know of course that that was the AIDS virus.

Again, a series of studies transmitting something to primates, to chimpanzees, which turned out to be the AIDS virus, reconstituting severely affected individuals, the affected twin, reconstituting their immune system, but it wasn't permanent. A lot of the initial information about what AIDS was and how it was caused and what you could do came from studies done here.

I've always said you could come to this campus any time, day or night, the lights would be on seven days a week. The lights were on; people were in the laboratories. It was not only a time of terror, but it was also a time of great excitement because you could actually do things that you thought would have an impact on something that was an evolving epidemic. We didn't realize it in the early '80s, but certainly by the late '80s. There was no question about it.

SS: Were you concerned about your staff and yourself?

HK: Absolutely. You're young and you're naive, and less concerned about yourself. Although I have to tell you that the scientific director of NIH, Ed Rall, who was a blood donor, came down through our clinic when we were taking care of some of the patients that we were reconstituting and told us we needed to be awfully careful. He was convinced at the time that this was a transmissible agent involved. I think we were probably less concerned about ourselves. We were doctors. This is what we were supposed to be doing.

It was interesting that I had staff who left the technology field because they didn't want to handle specimens from these patients. There were surgeons in this hospital who didn't want to operate on these patients. I even had a colleague who said, "I can understand why doctors don't want to take care of these patients." I didn't understand that. I think I was concerned about the staff for a variety of reasons. We certainly gowned and gloved as if this was a transmissible agent even before we knew it was a transmissible agent.

We had many blood donors, long time blood donors who would come down here. Now this is a medically sophisticated institution and people would come down and say, "I've been a blood donor for ten years and I don't want to do this anymore." And we'd say, "You're donating blood. The needles are sterile. They're used once then discarded." "I know that. Intellectually I understand that, but emotionally I just don't want to be involved in anything that has to do with this disease." So we lost a number of long-time, loyal blood donors who were just so frightened by the concept of the disease that they didn't want to be associated with blood in any way.

It was an interesting time, a frightening time, but a very rewarding time, because as you can see, the result of much of the work that was done here at NIH resulted in AIDS now being a chronic disease rather than a death sentence.

When I said this was a great place to do research, one of the things that we had at NIH much more so back in the '80s and earlier than today is that we have retrospective review of our science. That is we have a quadrennial review. Every four years experts come from outside of NIH and review what you have done and then determine whether it's of high enough quality so you should continue to be supported or receive more research support, rather than submitting grants to be funded prospectively.

So we could start working on these severely affected unusual patients immediately rather than submitting our NIH grant and waiting for funding to come. Because we had, for example, the work with hepatitis and the tools to do this, we could switch to looking at these patients rather than the hepatitis patients without having to submit a grant and waiting to see if it would be funded. So it was no surprise to me that the Intramural Program at NIH were really leaders in the research being done on AIDS while many of the very bright investigators at other institutions were waiting for sufficient funding to come to do that.

As you know, the government was not a great supporter of research in AIDS in the early 1980s. Aside from the Surgeon General, Dr. C. Everett Koop, who wrote a letter to every single family in the United States about AIDS, the administration was not particularly interested in AIDS, but NIH was and the Intramural Program was. And the Intramural Program in many areas, the Cancer Institute; Heart, Lung, and Blood Institute; the Allergy and Infectious Diseases; and the Clinical Center were all working on this disease from day one.

SS: I think what you're saying is the government wasn't interested because it was a gay person's disease?

HK: Well, that would be my interpretation. It was the “gay plague.” Yes, it was politically not tremendously supported, but the Intramural Program at NIH had doctors and scientists and doctor-scientists, and all of them were quite interested in taking care of these patients, finding out what caused it, even before it was appreciated that this was going to be a major problem.

Again, the NIH has been such a wonderful place to look at rare diseases and find out whether a rare disease can give you a clue that's more broadly applicable. Can you find a mechanism? At that point in the early '80s, this was a rare disease. It was a combined immunodeficiency syndrome and by looking at these rare patients, before we even appreciated that in fact it was going to be an epidemic, by the time we got into it, it was pretty clear that it was going to be an epidemic. So for a variety of reasons, both humanitarian and scientific, this was a leadership place. And they were wonderful times from that standpoint, even though they were terrifying for other reasons.

SS: Thank goodness for the NIH.

HK: I thought so.

SS: Also at this juncture, in 1983, you became chief [of the Blood Bank]?

HK: I did.

SS: The Blood Bank first and then you changed the name of the Blood Bank. Tell me about both of those things. They seem to be linked. I'm not sure if that's true.

HK: It is true. First of all, blood banking, immunohematology and blood banking as a specialty and a board specialty, is under the general specialty of pathology. I trained in internal medicine. I was a clinician. I saw patients and as a practicing hematologist and a research hematologist I was interested in going to the bedside and taking care of patients. Two of my predecessors here were as well, even though in most blood banks around the country many pathologists were not interested in going to the bedside or were interested in the laboratory alone. And from what I saw here, I thought that the future of blood transfusion was as a clinical specialty.

I had introduced the apheresis, collecting cells both for transfusion and for therapeutic purposes, to the Clinical Center. As a clinician I was happy to take care of sickle cell patients. I was a physician who was attending on the hematology service here, overseeing treatment of patients for many years on the hematology service of NHLBI. I would take care of patients for several months of the year.

I thought that the concept of blood banking was far too narrow and that this was a much broader specialty because it involved treating patients, not just collecting and preserving blood. It was both a laboratory specialty and it should be a clinical specialty, and that's what we did here. We started a number of apheresis services, processing bone marrow and taking care of sickle cell patients and a variety of other patients.

I remembered a physician that I knew, Tibor Greenwald, who had been the Director of the American National Red Cross Blood Program who said that the Germans used the word "Transfusionsmedizin." I knew a little bit of German. I was a German literature major. And I thought, “transfusion medicine.” And we agreed sitting around there that this would be a good name for this specialty, and that was my editorial.

I was determined that this department would be not a blood bank, but much more than a blood bank. It should be a department of transfusion medicine and that's what we renamed the department. It was the first Department of Transfusion Medicine in the world. Now everybody has a department of transfusion medicine. We were the first.

SS: Trendsetter.

HK: We were the trendsetters. And we did a number of other things. We introduced therapeutic apheresis to the Clinical Center. The HLA (human leukocyte antigen) laboratory, which makes transfusing platelets, the clotting factor, clotting cell, much easier because you can make those cells much more compatible with some patients if you type their HLA type, their tissue type. We established that laboratory in this department.

Then in 1984, we thought since we were processing bone marrow for the bone marrow transplant program here we should have an area for cellular therapies. So in 1984, we established, that was a year after I became chief, the section for cellular therapies, which we called the Cell Processing Section. Now it's the Center for Cellular Engineering. Then it was just one physician who was a former fellow of mine, Dr. Elizabeth Read. We kept her on the staff as the head of this Cell Processing Section, and a young biologist who didn't have any advanced degree, by the name of Charles Carter. Our laboratory upstairs is now named for Charley Carter [Charles S. Carter Cellular Therapy Laboratory]. He is deceased, but he was just a genius in culturing cells.

We established the Cell Processing Section and the first gene therapy performed anywhere in the world was for cells we cultured here in this department and put into a patient with severe combined immunodeficiency disease. We started the Cell Processing Section, which is now the Center for Cellular Engineering.

Today we have thirty or forty different cellular therapy protocols, whether it's gene therapy or CAR-T cells. You can name it and it's done here. But then it was just processing bone marrow and eventually culturing cells and putting genes into cells. So it was transfusion medicine and not just blood banking. We didn't just bank blood.

SS: It seems like for about forty years you were the chief.

HK: Yes. Thirty-six years I was the chief and forty-six years I had been at NIH.

SS: The evolution, the change from the blood bank to the Department of Transfusion Medicine is huge.

HK: Absolutely huge. The kinds of things that we do have evolved. It has become a much more clinical specialty and it's changed dramatically in a number of ways.

SS: One of the ways is it must be much bigger.

HK: It's much bigger. Now we have close to 200 people here. We had about twenty-five when I came.

SS: And there's an offsite portion?

HK: We do. One of the issues, we collect virtually all the blood that's transfused to patients in the Clinical Center. We collect it and we prepare it, and we ran out of space for one thing. And for a second thing, as you know, there's a fence around NIH now. When I came here there was no fence. There was no identification card. There was no security as such.

It's pretty hard to get volunteer blood donors to come from the community here, so putting a facility offsite had two advantages. The first was it gave us additional space, which we didn't have in the hospital. The second was it made it much easier for the community to donate blood. Many of our whole blood donors are NIH faculty or NIH employees at all levels, and we have about 10,000 of those. But for our platelet collections, most of them are volunteer community donors, so it's much easier for them to donate offsite than it is to come get identification cards and come through the fence.

SS: Tell me about some of the most important changes or anything that stands out in your mind.

HK: I think the apheresis is a very important one. We have a clinic here that is called the Dowling [Apheresis] Clinic. Regina Dowling was one of the head nurses that I had here. Before she came here, Regina Dowling was with the Cancer Institute and she worked with Emil J. Freireich, who was a Cancer Institute physician. He was one of the leaders in developing the blood cell separator, and the nurse who worked with him was Regina Dowling. He eventually went to M.D. Anderson and we recruited Regina to come down here.

There's a history of blood cell separation both from the work that we did with the sickle cell patients to the work that was done in the Cancer Institute. Regina was with us for I guess at least fifteen years, so we named the clinic after her. So we have the Dowling Clinic and we have the Carter Cell Processing Laboratory for Charley Carter, the young biologist who worked with us for twenty years. So apheresis, cellular therapies, tissue typing—and the other thing that fairly recently we've become quite involved in is the genomics of blood transfusion.

Now the Blood Bank here in its earliest days was one of the leaders in using computers in blood transfusion. That was before my time. Paul Schmidt, who was the chief of the Blood Bank—one of the earliest chiefs—probably the second chief of the Blood Bank. Paul Holland was the third, and I was the fourth. Paul Schmidt was very interested in computerization and NIH was actually a leader in information technology, believe it or not, because NIH had a big central computer, a mainframe computer.

Paul Schmidt decided to computerize all of his volunteer blood donors. So he typed them for twenty different red cell antigens and he put those data into the mainframe. And every time one of these donors came in he could call up the mainframe computer, he could find out what their blood types were, not just AB and Rh, but also twenty different red cell antigens. We would go over to CIT and pick up these sheets that had all of our donors on them and carry them back, and then telephone the information back to the mainframe computer. So we had the first computerized blood donors in the United States and probably in the world.

SS: In the mid-'70s?

HK: In the mid-'70s, yes, actually in the late '60s and into the '70s. That was a tradition of being a computerized system. Then we were one of the earliest ones to develop computerization for the rest of the laboratory and, actually, helped to develop the information system for cellular therapies with a commercial firm and helped to develop the computerization for blood collection and processing.

And then we became very interested in the genomics. Now with next generation sequencing (NGS) we already do that in the HLA laboratory. We're among the first and we're very much involved in next generation sequencing, which requires talents that I don't have for sure in big data manipulation, and of course having the genome with the Human Genome Project. We look at the area for red cells and platelets on the genome and now we are able to get exactly the right kind of donor we want for the right kind of patient. We think that eventually all patients are going to have their genomes on their medical record and all the blood donors will have their genomic data and it will be much easier to match them. So we're now very much involved in looking at predicting the genomics of the genes responsible for the antigens and transfusion, whether it's red cells or platelets.

SS: Very cutting edge.

HK: That's cutting edge. And as I said to a number of my younger staff, "I wish I was twenty or thirty years younger because you have tools today that I didn't have back then." I'm not sure that I'm not smart enough to deal with them, but this is an exciting time.

SS: I don't know how you got everything done in the day. In addition to your work, you were a consultant, you've done research and published, you were on lots of professional committees, editorial boards.

HK: I've been very fortunate. I've had a terrific staff here, so I hope you don't think that all these things I've done, because it's been a blessing to have such bright people who have come here and trained, many of whom have stayed, some of whom who have gone onto careers elsewhere, but have contributed enormously to all the things that have been done here. Yes, I've been fortunate that I've been able to participate in policymaking both in the government and non-governmental organizations such as the American Association for Blood Banks and the World Health Organization. For me it's been wonderful. It's been a wonderful time.

SS: Do you want to speak to some of your professional organizations you've worked with such as WHO or editorial board memberships? Do any of those stand out in your career retrospective?

HK: Well, again, because I was a clinician and a researcher it opened up a lot of possibilities for me, not only for personal and professional growth, but for influencing the discipline. I just found out that it's been twenty years that I have been on the Research Review Committee for the National Blood Service in the United Kingdom and helped them develop their research activities from a very vestigial area to the point where I think they're one of the best in the world. That's not necessarily from my doing. I was the only American involved and they had a couple of people from other European countries that came to the United Kingdom to do that. I was able to influence them, again, to go beyond just what you do in the laboratory and to look at the patient and also the effect of blood collection from the donor. I think that's made some impressions on the discipline that have been very important, not just in the U.S., but internationally.

I was also recruited to the World Health Organization, because I was a clinician as well as a researcher, by a very well known clinician from the Netherlands by the name of Pim van Aken. Pim was a Man of Orange, which is the Dutch equivalent being an Order of the British Empire. He was on a WHO standards committee and he was the person who was looking at standards in blood transfusion for various blood cells. He said, "The one thing they really lack, they're very good in regulatory issues and laboratory issues, but they don't know very much about clinical issues, and they really need someone to help them develop standards for blood services and for donors, and patients, and not just for cells and proteins. They're great at looking at cells and looking at standards for the proteins that you get out of blood, not so good at looking at standards for blood transfusion and for taking care of the people that donate the blood, what should the standards be." So he recruited me to the Standards Committee. It's actually called the ECBS, the Expert Committee of Biological Standardization, of the World Health Organization. And I just determined last year when they asked how long I had been doing that, it's been fifteen years.

A number of the things we were able to do, and I didn't do them myself, I did them along with a number of other very bright people, but it's made an impression worldwide, is to help to develop standards that have upgraded developing countries' blood services. That stands out to me. I'm very proud of that because it's one thing to make a small change in a very fine service in the United States or Canada or the U.K., and it's something altogether different when you can do that for Malaysia or Indonesia, or any of the African countries. We were also responsible for adding blood components to the WHO Essential Medicines list. You would have thought they would have been there, but they were not. This had great implications for developing countries, because governments use this list to distribute funding.

SS: You can help more people?

HK: Help more people and you can make such a major advance in safety and treatment, whereas in the U.S., it's an inch and in Africa it's three feet. It's been extraordinarily rewarding the fifteen years that I've spent there. It's a week every year in Geneva where my wife won't go because she said, "You start at eight in the morning and you come back at seven in the evening, and then you work into the night so that you have something for the next day." She said, "That's no fun." I said, "Actually it's quite rewarding," with a number of very bright people from around the world, both from developed countries and developing countries. I've felt very blessed to be able to make an impact internationally, so that stands out as something that I'm quite proud of.

SS: You've spoken several times about standards for blood donation. How has that changed over time and what is your place in that?

HK: Blood donation has changed dramatically. I have to say that in the early '50s, '60s, and '70s there was an appreciation that people who donated blood changed somewhat. There were some adverse events that take place such as fainting. But what the impact would be on someone who spent twenty or thirty years donating, whether it's whole blood or platelets, or plasma, it wasn't well appreciated what the impact on the donor's health was.

So I started on the ground floor looking at some of the changes that take place and fortunately finding that by and large there's little adverse effect on blood donors. Although we did find that there are some things that one has to be very cautious about when you're taking blood frequently from normal individuals that you have to monitor and have to be concerned about.

Once again, NIH is such a wonderful place because, first of all, we have donors who come here for twenty or thirty years. In fact, at one point Howard Drew was our blood donor who was in the *Guinness Book of World Records* for the most frequent donations. I guess Howard got into the book back in the 1990s or early 2000s. Also you could study them because the volunteers here, again with informed consent, they understood that this was a research organization, so you're not only looking at the patients, but you had the ability to look at the donors, both for their own sake and even not necessarily for their own sake, but for the sake of science.

So we've done a great deal of research on blood donors here and frequent blood donors or people who have been donors. That's something that I think would have been difficult to do anywhere but at the NIH Intramural Program. Many of the blood banks and blood centers didn't have the resources to do that. They're businesses by and large, health businesses, but businesses. And we're a research organization. So we had frequent donors and we had the resource to look at those donors and see what happens to you when you donate 500 times. Are there changes and if so, are those bad changes, if so, can they be reversed?

SS: Interesting, I'll have to read some of those papers. When I was listing all the things you have done, I neglected to mention that you also taught.

HK: When I came here there was a fellowship program. It was a two-year fellowship program. The first year allowed you to get enough training so that you could pass the board in Blood Bank and Transfusion that was under the American Board of Pathology. I came here for that one year. The second year was to be a research year. At the time, and probably still, it was the only program in the United States that had two years. The other programs all had one year that allowed you to become board certified. Then you went out and you ran your blood bank or whatever. Here we wanted to train people who did research. The second year was just to get you started.

We had a fellowship with one first-year fellow and one second-year fellow. I expanded that while I was here and now we have three first-year fellows, three second-year fellows and many of the people around the country who are interested in transfusion-related research have come through the program here. We had our own program, which I didn't start, it was existing when I came here, but I certainly expanded that. At the same time, coming from Johns Hopkins, I never gave up the connection there.

When I first came here I used to go back to the hematology clinic on Thursday afternoons and teach hematology and blood transfusion to residents and fellows at Johns Hopkins. Then I continued that and I remained an adjunct professor at Hopkins, both in medicine and in pathology, which are two different areas at Hopkins. I was a hematologist by training, so I very much enjoyed teaching blood transfusion to the clinical hematologists, none of whom trained at all in blood transfusion. They were training in other areas of hematology-oncology. The people who came through pathology at Johns Hopkins learned all about the laboratory aspects of blood transfusion, but maybe needed to learn more about the clinical aspects.

I was fortunate to be offered appointments in both departments. For many years, I went there every single Thursday afternoon. I would go to Johns Hopkins. Lately—being the last ten or twelve years—I've lectured there, but I haven't taught in the clinic. I haven't had the time to do that.

I have to say I miss that. If there's anything that I miss in the last twenty years it's the attending physician, seeing patients at the bedside. I miss that a lot. It's been about twenty years. I still go to the bedside. I take people to the bedside, to the operating room, but I'm not an attending physician any longer. I simply haven't had the time to do that, and secondly with things like stem cell transplants it's a subspecialty, and if you don't do it a little more than a couple of months of the year you're not doing well by your patients. I felt that I wasn't doing it frequently enough to be as expert as I needed to be.

So I miss that and I miss teaching the residents and clinics at Hopkins. One of my colleagues who is also a hematologist by training has run the department at Johns Hopkins for a number of years. Even though I'm not going there they're still getting a fair amount of transfusion medicine and not just blood banking.

SS: You've mentioned some of your fellows and colleagues. Are there others who stand out?

HK: Susan Leitman, who came here as a fellow and then stayed here for about thirty years, and was my assistant and also section head of the Blood Services Section. If you look at her publications you'll find not only a large number, but also seminal publications in blood safety, apheresis, and many areas, again, a hematologist by training.

Elizabeth Read, who was the first physician in what's now our Center for Cellular Engineering, was a fellow here as well and we kept her here. Then she left for a short period of time and was a director of one of the Red Cross centers. Then we recruited her back and she was here for about twenty years. In terms of both training people and in publishing original work and helping to develop cell processing or cellular engineering—a key person. David Stroncek followed her in the Cell Processing Section and now directs our Center for Cellular Engineering.

Dr. James Aubuchon, who became a major player in the Red Cross, went on to be professor and chairman of pathology at Dartmouth, and then ran the large blood service in Seattle, the Puget Sound Blood Center. He recently retired and was a fellow here. There are several others. I almost hate to name names because I'll miss people.

I think for a very small department relatively speaking compared to the National Red Cross, I think we've had a major impact nationally and internationally. We've had a couple of fellows that have come from Spain and from Ireland who have been here and have gone back home and made major impacts on their countries. I'm really very proud of the teaching and educational aspects of this department. It really has been a triple threat department in terms of service, research, and education.

SS: The Clinical Center has gone through a lot of different building changes. Has that impacted the department?

HK: Very much so. In 1953, when the Clinical Center was opened, the first Blood Bank was actually on the seventh floor of the Clinical Center because the Blood Bank laboratory wasn't ready yet. So it was in a nursing unit on the seventh floor. I think they had twenty-four units of whole blood, one technician, and one physician. Shortly after that it went into the basement next to the pharmacy, which was in the basement in a terrible facility, and fortunately I wasn't here at the time and didn't have to live through that.

Then Paul Schmidt, who as I said, was the second chief here, designed a blood bank. You can still see it today. It's the circle that's attached to the old Building 10. You'll see it's a purple circle. Schmidt designed it. The upper floors were actually heart surgery, and they were the big customers. We had a dumbwaiter so that you could put the blood into the dumbwaiter and it would go up to the open-heart surgery operating rooms. He designed it, or so he thought, that the blood donor would come in and would be screened, and would donate blood. Then the units of blood would be taken back to a laboratory where they would be separated into their components. And then it would go to the laboratory that would type and store the blood, and then it would come out the other side. So it was a big circle.

SS: So it was like an assembly line for blood?

HK: Yes. It was an assembly line for blood. We have a model of that circle, which is in our foyer here that we still have from when that was designed. That's no longer the Department of Transfusion Medicine. We were forced to evacuate that at a time where NIH was under fire for mistreating animals, not treating them appropriately, and they emptied out that circular area and they made it a small animal facility. I always said the animals were obviously more important than the blood transfusion people. So we were placed on the fifth floor of the old Clinical Center as temporary quarters.

At about that time, open-heart surgery was changing dramatically here. The open-heart surgeon who had run a program that was famous worldwide, he had trained I don't know how many surgeons who had gone on to be chiefs of surgery around the country. They invented valves and also collaborated on the transfusion-transmitted infections research. He retired.

SS: Who was that?

HK: Glenn Morrow. He retired. They wanted to recruit a new cardiac surgeon. It's pretty hard to recruit a cardiac surgeon to the government facility at the salaries that you pay government people and the salaries that even back then in the late 1980s that they were paying cardiac surgeons.

In order to recruit someone they said they'd build them new operating rooms. So they designed a new building, and the new building that they designed was the C wing, which is where you're sitting now. The C wing was to be designed so that it was a building on stilts and the operating rooms were on the second floor. I saw that and I may still have the memorandum. I sent a memorandum to the director of the Clinical Center. It may have been the only time in my experience at NIH that a major change took place because I actually sent someone a memo. I said, “Why in the world are you going to have a building on stilts? Why don't you put the Blood Bank, which used to be under the cardiac surgery in the old round building—why don't you build a building? We'd be on the first floor and they'd be on the second floor, because if you ever decide later that you want to fill in that area it's going to be so much more expensive to do that.”

And to my great surprise someone with some influence decided to do exactly that. So the new Department of Transfusion Medicine, which opened in 1990, was the first floor of the C wing, which is where we are now, and the operating rooms were on the second floor.

Not long after that they discontinued open-heart surgery at NIH, which I thought was interesting. The surgeon left and the Heart, Lung, and Blood Institute decided they didn't want to do heart surgery. The research wasn't important enough any longer that they were doing here and it was too expensive for what they wanted to do. They used that money to begin a stem cell transplant program in the institute and the cardiac surgery disappeared and the fellows in cardiac surgery were placed elsewhere around the country. We still had the first floor and a brand new, beautiful transfusion medicine facility, which is what we have now.

We've recently designed a new facility, which will be in the renovated Building 10, which is scheduled to open in 2021. I call those “NIH years,” so I don't believe it will open until 2022 or 2023. But it's been totally designed, I'm told that the funding is there, and it's a number of floors of the renovated Building 10. So this will be closing sometime in 2021, 2022, and they'll be using these facilities, they may even be rebuilding this facility for other purposes. But the Transfusion Medicine Department will move to Building 10.

SS: Will it have public access?

HK: It probably won't be quite as convenient as it is now, but it will have access for blood donors.

SS: You've also won many awards, a lot of NIH Director’s Awards and Lifetime Achievement Awards.

HK: I was particularly pleased with the Presidential Award, which was sort of a Lifetime Achievement Award that I received from the International Society of Blood Transfusion, even after I was no longer a member. I thought that was nice of them. Then the American Association of Blood Banks, AABB, gave me an award fairly recently, two or three years ago, the Fantus Medal, which was their equivalent of a Lifetime Achievement Award, which is given no more frequently than every five years. So I was very pleased to have been recognized for that.

I just feel that I've been so fortunate to be able to work with so many good people that other people who had more talent and energy than I have weren't put in the position where they would be able to do those things. But being at NIH and having such wonderful people—not just in the department. We mentioned Tony Fauci. I didn't mention Arthur Nienhuis, who directed hematology at NHLBI for many years and then went on to be CEO of St. Jude Children’s Research Center, a long-time friend and collaborator of mine. You could go on—Henry Masur, just wonderful people here on the NIH campus. I hate to mention names because I'll miss so many of them.

SS: You collaborated with so many.

HK: Yes. And even when they were informal collaborations, just sitting and talking, and being with them. It's just been a wonderful place and a wonderful time, the 1970s through to the present has been a Golden Era, as far as I'm concerned.

SS: Were you ever tempted to leave?

HK: Several times. I spent twenty-five years as a uniformed officer in the Commissioned Corps [of the United States Public Health Service]. When I say uniformed officer—I never owned a uniform. I did have my picture taken in a uniform, but I borrowed a hat and I borrowed a jacket, and they only took the picture from the waist up. I was in the Commissioned Corps for twenty-five years, and at the end of that period of time I had looked and been recruited for a number of positions, but none of them I found particularly as attractive as being here in the Clinical Center.

At that time, I was being recruited by Dr. Phil Pizzo, who had been with the Cancer Institute, was a pediatrician by training and infectious disease expert, and a wonderful clinician and researcher. He moved to Boston and became the Physician-in-Chief at Boston's Children's Hospital, Harvard Medical Service, and recruited me to put together a program for the different Harvard Blood Transfusion Services—Children's Hospital, Brigham and Women's, Mass General Hospital, and Beth Israel, all of which are Harvard services.

If you know the politics of Harvard, everybody is a chief there. So uniting all of those into a single—what I felt would have been a very powerful Department of Transfusion Medicine—was a very challenging opportunity, but also a very difficult one. I looked long and hard at that. I was very tempted. After all, I had been a Red Sox fan from the age of five. Going back to Boston, people don't like the New England Patriots, but I was there when they were the Boston Patriots, when they were established. So it was very tempting for a variety of reasons to go back to Boston and to go back and be part of the Harvard Service. My family and I thought long and hard and that was a great temptation, but in the final analysis, I decided to stay here for the second half of my career in the civil service for twenty-one years after that.

It was twenty-five years in the Commissioned Corps uniform service and twenty-one in the civil service. I have to say that although I think it was a great opportunity and a wonderful place, and I've always loved Boston as well, I've never looked back and said, “Should you have done that?” I’ve never regretted that decision. It's been terrific to be here for that second half of my career.

I looked at a number of places, the Mayo Clinic, the University of California in San Diego and San Francisco, but that was the only one [that tempted me]. When I did look at the Mayo Clinic again, my wife said, "How cold does it get in the winter?" Then she said to me, "It would be a long commute for you."

SS: She's been integral to your career.

HK: Absolutely. I've been married for fifty-five years, same woman, and she has been integral to my career. I've often said that. I have to tell you, Susan Leitman who was here for thirty years, one time when we had a reception at my home, she looked at my wife and she said, "What I need is a wife." It's true. It has been a partnership and I don't think I would have clearly been able to do half of the things that I was fortunate enough to do if I hadn't had such support over the years.

SS: Did she work outside the home also?

HK: Yes and no. When I was in medical school she worked in the president's office at Johns Hopkins. So I met the president of Johns Hopkins when I was a first year medical student, which was interesting.

When we started a family, when I started my residency, she stopped working. When I had two children in college, she went back to work and when the final child graduated she told me she retired, and she did. I came home one day and I said, "What did you do today?" And she said, "I retired." So she has worked on the outside, but during what I consider the critical years of our family she took care of the family and she did all the things that maybe I should have been doing, but didn't have the time. It's been a spectacular partnership. I couldn't have done anything if I hadn't had Sigrid.

SS: You have two children?

HK: I have three children, none of whom have gone into medicine. I'm told that there's a message there. All three of whom I consider have been successful. My oldest daughter and my two grandsons are in Baltimore. She does experiential education and she's now involved in healthcare education in the Baltimore school system. My son is a lawyer and went to the University of Michigan where he met another lawyer. They got married and stayed in San Francisco because she's originally a California girl. My two granddaughters are in San Francisco.

My third child, who actually has worked for the History Department here and wrote something called "The Legacy of the ‘Yellow Berets,’" Melissa Klein, which was a history of those who came, like me, during the Vietnam Era, we called ourselves “the Yellow Berets.” You can find her piece on the Internet. She worked with Victoria Harden and she got together all of the data from the various institutes about the people who came here during the Vietnam Era.

SS: There were a lot.

HK: There were a lot. She had a number of original observations. But I thought one of the critical, important original observations that she made from doing that work was that most of the people who came to the NIH Intramural Program, almost all were men. She interviewed various people. She was told frequently they wouldn't take a woman because they felt that would send a male to Vietnam. Women weren't drafted. They were almost all men, very few exceptions.

Bernadine Healy, who was my intern at Johns Hopkins and who went on to be one of the directors of NIH did come to NIH during that period as a cardiologist. But virtually everybody else was male. The observation that she made was that during those years, the 1950s-60s, NIH was the prep school for chairs of medicine for universities. It was an old boys' club. The fact that women didn't come to the NIH Intramural Program to do research was probably a factor in setting back women in academic medicine at high levels for a generation. I thought that was a really interesting observation and that was her observation.

I think, obviously, there were other reasons. There weren't many women in medicine because women weren't accepted in medicine in the United States in those days. I think in terms of academic achievement, if you hadn't spent time doing research in the NIH Intramural Program you were disadvantaged. If you looked at the chairs of medicine around the country almost all of them spent two or three years in the NIH Intramural Program.

SS: That is fascinating. It's also interesting that a lot of couples were hired.

HK: That's right.

SS: So possibly the women came in through another door.

HK: I don't whether you've talked with Alan Schechter. Alan Schechter has been here longer than I have. I would tell Alan this, but I think his wife Geri is smarter than he is. The two of them applied. Alan was accepted, Geri wasn't. She went on to have an excellent career at the VA in Washington, D.C. There were several other couples like that where the man was accepted and the woman was not accepted, not just because she didn't have the credentials, but there was clearly discrimination, for whatever reason, but part of it was that's taking a position away from someone who is going to end up in Saigon.

SS: Very interesting.

HK: I thought so.

SS: So you just retired last year.

HK: I did, first of October.

SS: You're now Scientist Emeritus.

HK: I am.

SS: What are you doing here now?

HK: A number of things. I've continued a couple of long-term collaborations that I've had in areas where I've tried to interest other people in transfusion medicine, and for one reason or another they're not all that interested, so I've continued those collaborations. I also have a number of young staff that I helped to recruit and who I've tried hard to put on to tenure track. A couple are on it now and at least one is getting ready. I wanted to continue to collaborate with and mentor them until they're established. That keeps me busy a couple of days a week.

I was just talking with one of my former colleagues and I said, "In the first six months that I retired, I probably submitted and published more papers than in the previous six months." But I came here to do research, and to see patients, and to teach. And in the latter part of my time here I found that increasingly I was doing administrative things. It's not that they weren't important, they were important. And I think I did them reasonably well, but I didn't particularly enjoy the amount of time I had to spend doing them. So it became a question of: Do you do them and continue to lead the department or do you let someone else do them and then you're working for someone else? I had elected to continue to do that.

So even though I had some great supporting people, there were just a lot of things that you didn't have to do in the 1970s and '80s that you had to do in 2010 and 2019. Incredible bureaucracy. Online courses, I've had to take courses and refresher courses on how to do research and of course in security. It's required. I gave a talk about a year ago in Montreal, and in order to be able to go there I had to take a four-hour online course in security. So I showed them my certificate, I made it into a slide when I gave my talk in Montreal, and I assured that if I found myself in a minefield in Canada that I knew exactly what to do, or should I be kidnapped, I could guarantee them that the U.S. government would not pay to ransom on me or my family. They thought that was very funny, because it was the same course that the State Department people take if they go into Iraq. And I had to take it in order to go into Canada. It was for overseas travel and I wasn't sure that it was appreciated that going to Montreal, probably the St. Lawrence River is not a sea, so it wasn't overseas. It was that kind of thing.

I appreciate medical ethics and I appreciate all the other kinds of ethics refresher courses. It came to be that I found the first two to three hours of my day were spent doing things that I didn't enjoy doing. I'm actually almost as productive in terms of research and teaching as an emeritus a couple of days a week as I was as a department head fulltime. Although, it's not that I didn't think they were important things, they were important things, it's just that I didn't enjoy doing all of them.

SS: You certainly have left the Department of Transfusion Medicine very altered.

HK: It's altered, but there are good people here. There are still the various section heads that are here and my deputy Bill Ward who I recruited about four years before I retired, they're just terrific people. So I felt very comfortable.

There are a couple of positions that I would have liked to have filled. It's been difficult for a variety of reasons to fill positions in the Intramural Program in the last three or four years. I would like to have filled [those positions] before I left and was unable to do so. One of the people that I thought would take my position ended up going to the FDA instead. I don't feel bad about it. The FDA needs good people, people who have clinical experience, but I wish she had stayed and taken my position. They are recruiting now for someone to take my position and I'm sure they will get someone who will be very good. The other people who are in place—they talk about “white collar” and “blue collar,” these are “gold collar” people. They're spectacular people and I'm very pleased. It's in good hands.

SS: What do you see as the next step for the Department?

HK: They'll be moving into new facilities and that will give them a little more space and also some better facilities for certain things, such as cellular engineering. I think that's the new area. It's not so new anymore, but it's certainly very exciting, whether it's cellular immunotherapy of cancer or gene therapy to cure sickle cell disease and a variety of other diseases. I think that's going to be just a tremendously exciting area.

Then I think the genomics in blood transfusion are really incredible. I have a young physician who came through our fellowship program and stayed on the staff who was a Mexican national. She does a number of things with services in South America and Central America. She recently went to Peru. I told her that I spent some time in Peru years ago. We were very interested in high altitude polycythemia. That is, as you go up your blood counts get high. That's why a lot of the Olympians train at altitude. We were very interested in trying to determine whether or not this was strictly a physiologic adaption or whether it was a pathologic thing that happened. And if you went up very high it was not a good thing for your health.

So with my collaborator Robert Winslow we wanted to study this at the highest laboratory in the world in Cerro de Pasco, Peru. We had a Peruvian collaborator, Carlos Monge, a wonderful man. NIH didn't think it was that important, but we got a National Science Foundation grant, and we went to Peru. We went to the highest laboratory in the world and did these studies. This is published as well. You can find the publications on high altitude polycythemia. We bled some of these patients down and exercised them before and after to see if lowering made them better or worse.

To make a long story short, some of these subjects developed hematocrits that were so high that their blood became so thick that it was a maladaptation. Why that happens isn't clear. But the reason I bring that up, is this young physician that we have here now going to Peru sat down and talked to her about that story. And I said, "We don't know why it is that some people who live at altitude do have higher hemoglobins but they're appropriate for the altitude and they function normally. Yet other people don't seem to be able to stop and their blood counts get higher and higher until it's a maladaptation." I said, "I wonder if it's genetic." She does genomics and she does sequencing. And she said, "I bet we could look at that now." So it's that kind of very exciting thing.

Now she's going to be looking at whether or not you can find the genes involved in people developing maladaptation at altitude versus people whose hemoglobins go up only to the point where they're able to function better at altitude. There's clearly some difference and it's probably genetic. But it's that kind of thing that keeps me going. You have now new tools. You have the human genome. Even with the human genome, if you didn't have powerful information technology you couldn't analyze the data. Now you can analyze the data. You can get the genomics. You can analyze the genomics. It's an exciting new world. That's the other area, cellular therapies and big data in terms of blood transfusion and hematology.

SS: That’s fascinating. Your work is still important.

HK: I think so.

SS: And now it's going to be looked at in a deeper way.

HK: Absolutely. We thought we had such sophisticated tools in the 1970s and '80s, and they were for the '70s and '80s. But now there are new tools and new people. This is a very bright young woman, Celina Montemayor-Garcia. She's doing all of her own programming even though she's an M.D.-Ph.D., but she also knows bioinformatics, and so does my granddaughter—my granddaughter, who is graduating from high school can program in several languages. So it is a new era with people who have new skills and talents, and can use the new tools. I think it is exciting time. I wish I were twenty years younger. On the other hand, it's nice not to have to get up early every morning and come in.

SS: Are you and your wife are planning on doing some traveling—at least before this latest situation with the coronavirus?

HK: Well I'll tell you, I'm a United Platinum flyer. I have more than two million miles.

SS: You've traveled so much.

HK: Yes. I am so happy to be home and do some of the things that I've not been able to do, some non-medical writing, some gardening. My wife feels the same way. We've been fortunate to have been all over the world. I don't get on an airplane very often anymore. I come from an era where you could arrive twenty minutes before your flight left, go through, and get onto your plane. Those days are gone, too. Flying is not that much fun anymore. It used to be a lot of fun. It's not that much fun anymore. Traveling isn't part of my long-term plan.

SS: I'm glad that you're actually doing some retirement activities.

HK: I am indeed. There are a lot of things that I like to do that I didn't do while I was at NIH. I have time to do them now and the leisure.

SS: Well, I guess this is probably my last question, unless you can you think of other things you want to add, and that is: What do you think your legacy is?

HK: For me, I think one of the most important things is—What is going to come from the people that you trained? A lot of things that I did that I think are really important will turn out to be very small things twenty years from now. I think the concept of transfusion medicine is important because I do think it changed the direction of the discipline. Certainly the people that came through here and the people that they will train are probably the most important thing by far.

The one thing that I hoped would be part of the legacy, and I don't know if it will be, is I was one of four people who established the NIH Running Club. We called it the Jogging Club and we named it “Health's Angels.” At one point there were several hundred people here during the era where marathoning was fun. I still have the original t-shirt that was designed by the medical illustrator here in the Clinical Center. It's still alive and well, because I think that exercise is such an important thing for a variety of reasons, especially for medical scientists who are spending a lot of time now sitting in front of their computers. I hope that will be remain active and be part of the legacy.

SS: Who were the other founders?

HK: One was Allen Lewis. Allen was a biologist in this department that I met when I came here and we used to go out running early in the morning. The third was Richard Davey, who was also a physician in this department, who went on to be chief medical officer of the National Red Cross, chief medical officer of the New York Blood Center, and also branch chief with the FDA for about five years, and is now retired. And the fourth was David Young who was with the Cancer Institute. And the four of us used to go out running very early in the morning and then come shower, and come to work.

On one of the runs, I'm not sure who generated the idea that we should form a club, but the four of us got together. I do remember that the name Health's Angels was David Young's creation, not mine, and it stuck, and it's still in existence, but sort of semi-active at this point in time. Allen Lewis is deceased. Rick Davey is retired and David Young went back to Montana. I think he had only been here two or three years as a research fellow with the Cancer Institute then went back and ran a Cancer Center in Montana.

SS: Shall we leave it with Health's Angels?

HK: You can leave it with Health's Angels, yes.

[End of interview]